

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington DC 20554**

In the matter of:)

Amendment of Part 97 of the)
Commissions Rules Governing the) **RM-11306**
Amateur Radio Service Concerning)
Permitted Emissions and Control)
Requirements)

**Comments Regarding the Petition to Allocate Frequencies in
the Amateur Radio Service by Bandwidth Filed by the American
Radio Relay League on 14 November 2005.**

My name is Timothy P. Gorman, AB0WR and I am a licensed amateur radio operator and a member of the American Radio Relay League. I have been active in amateur radio for more than 40 years. I have a BSEE degree from the University of Kansas.

I. Background and Introduction

1. The proposal makes numerous unsupported claims concerning operations in the amateur bands and the need for a new regulation paradigm. No spectrum usage studies, spectrum efficiency studies, technical efficiency studies, or economic efficiency studies are provided to support the claims. In fact, many of the claims can **not** be supported. The ARRL apparently expects the FCC and the amateur community to accept the claims anyway.

2. Some of the areas I will address are as follows:

- The supposed need for bandwidth regulation to foster digital experimentation
- Confusing new emission designators with new technology introduction
- The supposed trend in the Amateur Service toward digital communications
- Effectiveness of voluntary bandplans
- Transmission of images using digital modes requiring bandwidth regulation
- The need for higher speed data communications on the HF bands
- Elimination of many emergency networks using fully automatic stations
- Manually interrogated automatic stations causing less interference
- Allowing wideband digital and analog modes on 30m

3. In all of these areas the ARRL claims are either misleading or false. I urge the FCC to reject this proposal in its entirety and to direct the ARRL to perform documented, publicly vetted studies to support their claims before resubmitting a new proposal.

II. Discussion

4. The ARRL proposal states “The specific bandwidth limits, once incorporated in the Rules, would allow a more natural development of new digital technologies.” The ARRL proposal also states “petition seeks for the Amateur Radio Service the flexibility to experiment with new digital transmission methods and types to be developed in the future...” as a supporting claim for the need to move to bandwidth regulation. In fact, the bandwidth regulation paradigm will provide less flexibility than exists today, provides a **less** natural development, and will stifle experimentation with new modes. Newer digital transmission methods today, such as Olivia, allow changing transmitted bandwidth to maximize speed depending upon propagation and band space available. Typical bandwidths are 250hz, 500hz, and 1000hz. Under mode regulation changing between these bandwidths is easy to accomplish. Under the ARRL bandwidth proposal, all Olivia communications will have to be in the wideband segment in order to gain this flexibility. This will put Olivia in competition for operating space with SSB users in a band segment with a much higher usage density. This proposal is, therefore, **bad** for the future development of spectrum efficient digital transmission modes. The proposal should be rejected based on the invalid ARRL claim..

5. The document confuses the issue of new emission designators with the introduction of new technology . The ARRL document states “ is to make it easier for new types of emissions to be introduced compatibly among incumbent emission types, while reducing or eliminating the regulatory burden of interpreting or applying rules to new technologies in the context of a presently cumbersome regulatory matrix.” The actual truth is that there has been no introduction of new technology in the form of new emission types on the amateur bands for over 70 years. All current digimodes in use today use the old technologies of FSK or SSB-SC. All of the newest sound card modes use emission designations beginning with J2 or J3. Thus the ARRL claim is a non sequitur. Their claim does not follow from their premise. If and when new technology is introduced, regulatory requirements can be addressed at that time. Since this claim by the ARRL is demonstrably false, the proposal should be rejected.

16. The ARRL document states “is a pronounced trend in the Amateur Service toward digital communications, without necessarily replacing analog modes.” The ARRL provides no spectrum usage studies to verify this claim. In fact, a competing proposal, RM-11305, provides a spectrum usage study to show that the claim by the ARRL is actually not true. Their study shows that digimode usage makes up about 10% of the total HF spectrum use. Studies using ARRL Field Day statistics show an even lower percentage of use for digimodes. This has not changed significantly for over a decade. The use of digimodes on VHF is actually an order of magnitude less than it was 15 years ago since many amateurs have shut down their Packet stations in favor of using the internet. Another reason the claim is wrong is based on sociological and economic reasons. Most of the newer digital transmission methods are keyboard-to-keyboard modes used for ad-hoc communications between amateurs seeking one-on-one communications. Most amateurs would rather use Morse Code or voice communications for one-on-one communications. This is reflected in the spectrum usage referenced above. Since there is no known driver to push amateurs into using keyboards to converse instead of microphones this will remain the case for the foreseeable future. The only other use which would advance the use of digimodes past the 10% level would be automated operations such as accessing Internet email via HF radio. Because the speed of access via HF radio will always be less than other methods such as broadband cable or even dialup telephony due to bandwidth constraints, HF radio internet access will always have a significantly lower economic marginal utility than the other available methods. This will always leave HF radio internet access as a niche market and it will probably never drive digimode uses higher than exists today. Since this claim by the ARRL is demonstrably false, the proposal should be rejected.

7. The ARRL proposal states “band planning must be adequate and must gain broad acceptance by amateurs as the best means of protecting their individual interests. Traditionally, these cooperative methods have worked satisfactorily.” First, there are no cooperative methods of establishing a voluntary bandplan in place today. The ARRL only represents about 20% of the amateur community and has no method in place of collecting, let alone addressing, the needs of the other 80% of the amateur community. In fact, the published ARRL bandplan is so far out of date and unusable that it is routinely ignored even in the digital community which this proposal purports to provide advantages for. Second, development of a cooperative process for establishing voluntary bandplans acceptable to the majority of the amateur community will take a significant amount of time. Implementation of the process in order to actually

develop an acceptable bandplan will take even longer. Since implementation of this proposal without an acceptable bandplan will result in chaos on the amateur bands, thus tremendously increasing the demand on the FCC to arbitrate conflicts among various interests, this proposal should be rejected until a process for developing a bandplan can be established and the process can be implemented. The FCC should instruct the ARRL to not resubmit this proposal until it has a bandplan available that is acceptable to the majority of the amateur community.

8. The ARRL document states “The real catalyst for change, however, is the need to permit higher speed data in the Amateur bands from 1.8 MHz to 450 MHz, above which there are no limits except to contain the transmitted signal within the allocation edges. A recent example of the concern was an inquiry received by ARRL from a technical experimenter, Mr. Steve Waterman, licensee of Amateur Station K4CJX, concerning the symbol rate restrictions of HF amateur communications”. Since Mr. Waterman is one of the main people involved in the Winlink 2000 system, it can be assumed that this query was to be able to allow higher speed data channels for use by Winlink 2000. The ARRL has provided no technical efficiency studies showing that the higher speed data channels would provide any benefits. The ARRL has provided no spectrum efficiency studies to show that this will provide for more users being satisfied or that the time spectrum is denied to users will be lowered in any way. These are two of the metrics the FCC has specified as being major parts of spectrum efficiency. Several issues need to be analyzed in detail in association with this claim.

a. The Winlink 2000 system carries internet email to/from end users using the amateur bands as end link telecom channels. It is a very inefficient system from a traffic handling standpoint. It has over 24 stations monitoring over 40 frequencies spread over many of the HF amateur bands. The system provides no signaling control typical of telecom trunk systems. Service requests made on channels not being monitored (because the hub station is busy on another channel) are left hanging to be reinitiated over and over. In order to increase capacity the system is forced to continually add additional channels and increase speed via higher bandwidth channels, typically 2.4khz wide Pactor III channels. If the system were to operate under traffic assumptions typical with Erlang C trunking systems using a 4 minute answer delay, the system could get by with the same 24 stations monitoring

only 22 500hz channels. If an Erlang C system using 30 minute queue times were designed for this system, a total of 5 500hz channels would be sufficient to carry all the traffic presently offered to the system. That is not 5 channels per amateur band but 5 channels total. One 500hz channel each on 80m, 40m, 30m, 20m and 15m. The Winlink 2000 system should not be rewarded for inefficient operation by being allowed access to increased spectrum and wider bandwidths. The FCC should reject this proposal and specify that traffic carrying systems using the amateur frequencies outside the automatic subbands provided in Part 97.221 must be designed using commonly understood traffic concepts and approaches in order to be considered acceptable.

b. Spectrum efficiency, as defined by the FCC includes the metrics of “users satisfied” and “time spectrum is denied to other users”. The ARRL did not address these issues at all in their proposal. In fact, the proposal will provide lower metrics for both than the system in effect today. Many of the digital transmission modes have power crest factors ranging from 2 to 10. Pactor III, with its power crest factor of 2, provides an average power output from a 100 watt transmitter of about 50watts PEP. SSB, on the other hand, has a power crest factor of about 25. That means that a SSB transmitter rated at 100 watts PEP would put out an average power output of only 4 watts. This low average power output for SSB coupled with propagation path loss between various parts of the country as well as voice characteristics such as syllabic and phrase pauses, which allows the human brain to distinguish different speakers in noisy conditions and allows frequencies on the ham bands to be used by more than one amateur conversation at the same time. This phenomena is known as propagation stacking. It is quite usual on 75m to hear a conversation in the Northeast, the Southeast, and the Central US in progress on 3920khz all at the same time in the evening. Low crest factor digital signals cannot make as efficient use of this phenomena. Higher average output powers cause more interference along the propagation paths so that mixing digital signals with SSB signals will result in a lower overall spectrum efficiency as far as the users satisfied metric is concerned. Another factor that needs to be considered is that of automatic robots in the SSB segments using aggressive ARQ modes such as Pactor III. These robots tend to dominate the frequency which they monitor. The modes do not provide any appreciable ability to detect other signal content on the frequency and, upon interrogation by another station, will start up and will make it impossible to carry on

existing conversations. This leads to the tendency of other stations to avoid the frequency thus significantly increasing the amount of time the frequency is denied to other users. This once again significantly lowers the spectrum efficiency of the spectrum in question. The ARRL apparently did not do any spectrum efficiency studies to identify these issues and did not consider the issues to be of any import when they were informed of them during the comment period the ARRL Board of Directors had before submitting the proposal. The ARRL proposal should be rejected by the FCC and should be instructed by the FCC to perform industry acceptable spectrum efficiency studies before submitting a new proposal.

9. The ARRL proposal would give so-called “semi-automatic” stations full access to all frequencies subject only to bandwidth limitations. The proposal states “It appears to be practical as a generalized operating practice. It should suffice for interference avoidance purposes”. This claim does not recognize the well known hidden transmitter effect. Even a cursory search of interference related documentation on the Internet would have identified the problems with what the ARRL is proposing. Because of ionospheric propagation effects on the HF bands, a manual station interrogating a “semi-automatic” station will have no idea of the interference effects that will result from starting the session. There will be no difference in result between fully automatic operation and semi-automatic operation. It is **imperative**, therefore, that any type of automatic operation be maintained in a specified, published sub-band so that all stations will be able to avoid interference from the operation of the automatic stations. Significant increases in interference complaints to the FCC will result from allowing automatic robot stations to proliferate throughout the amateur bands, particularly in the densely populated segments where SSB operators will be. The FCC should reject this proposal based on this false claim.

10. The original documentation the ARRL provided to members concerning this proposal included the following statement.

“One new limitation being proposed, as recommended by the Ad Hoc Digital Committee, is to eliminate fully automatic control of HF data communications in the bands below 28.0 MHz. Fully automatic control, where both stations in communication are under automatic control, was initiated in the mid-1980s to provide for the automatic forwarding of messages using the AX.25 packet protocol. Today it is not necessary and complicates efficient sharing of crowded HF spectrum.

However, "semi-automatic control," where one station is automatically controlled but all communication must be initiated by a station under operator control, appears to be practicable. Therefore, modifications of § 97.109(e) and §97.221(b) are proposed to eliminate automatic control of HF data operation below 28.0 MHz except where one station in communication is under local control of an operator."

While the ARRL has not included this verbiage in the actual proposal, their changes to 97.109(e) and 97.221 that would result in the elimination of fully automatic operation on HF are still in the proposal. The move to eliminate fully automatic operation was initiated by the ARRL Ad Hoc HF Digital Committee. This committee had seven members, four of which were Winlink 2000 (WL2K) supporters. The WL2K software author was the chairman of the committee. During the existence of the committee one of the non-WL2K members resigned in protest over the actions of the committee chairman. One of the other non-WL2K members issued a written opinion dissenting with the majority committee report. The ARRL would not accept the dissenting opinion. It is apparent that the recommendation of the committee to eliminate fully automatic control was to eliminate competition with the WL2K system from other systems such as the National Traffic System - Digital as well as numerous local emergency networks deployed using VHF packet radio and such software as JNOS and TNOS. This is obvious from the Ad Hoc Digital Committee report that states "The forwarding of packet messages over Internet is a practice that is already being widely used by radio amateurs and should be encouraged to relieve congestion on the HF bands where HF radio links are not essential." The problem with this position is the last few words that state "HF radio links are not essential". First, the regulatory changes proposed for 97.109(e) do not specify that it only applies to HF stations. It will apply equally to VHF Packet radio stations. Second, the Amateur Radio Service is in existence to use radio, to advance the art of radio and radio communication, and to provide service to the public during emergencies all through the **use of radio, not the Internet**. It is also a fundamental principle of emergency services that radio links are not essential until they are needed. In order for them to be in operation and working when they **are** essential, however, they must be in use and used during nonessential periods. While the synergy between Amateur Radio and the internet is important for advancing communication capabilities, the use of the internet should never be allowed to totally supplant the use of Amateur Radio. As seen during the recent hurricanes along the Gulf Coast, the loss of the internet would be crippling if it were to become the only form of carrying Amateur Radio traffic nationwide. WL2K is not ubiquitous throughout the nation and probably never will be. That means that the NTSD and the other emergency

communications networks not using WL2K will be needed for the foreseeable future and must remain in operation. Since many of them absolutely depend upon the operation of fully automatic stations, the changes in the proposal to modify Part 97.109(e) and Part 97.221 should be rejected. The ARRL should be admonished that the purpose of the Amateur Radio Service and the regulations governing it are to implement the purposes in Part 97.1 which address the use of radio, not the internet.

11. The ARRL proposal changes the operating restrictions on 30m to allow SSB and wideband data signals. This is in total conflict with IARU Region 1 and Region 2 bandplans and will result in significant interference complaints. The 30m band was allocated to amateur use based on it being for narrow bandwidth use only. That is why the allocation is sized as it is. Amateurs must avoid interference to fixed operation outside the US. The difficulty of performing this task will be increased significantly if the band is allowed to become filled with SSB operation. While the ARRL states it will recommend via a voluntary bandplan that SSB signals stay off of 30m, a voluntary bandplan which provides for no enforcement sanctions will not be able to prevent amateurs from migrating to 30m to avoid interference on other bands. This will be especially true if other countries abide by the recommended restrictions and continue to restrict SSB stations from operating in that band. The FCC should reject this proposal based on this false claim. The ARRL should be admonished that any proposals they make should be in compliance, as much as possible, with international recommendations for use of spectrum allocated to the use of amateur radio.

III. Conclusion

12. Most of the claims made by the ARRL in support of their recommended change to bandwidth regulation are not supported by actual data and have been shown to be technically and factually incorrect. The proposal is based on wishful thinking instead of rational thought and physical data. Bandwidth regulation will impose its own type of restrictions on experimentation with digital transmission methods and the proposal does not even recognize this let alone offer any solutions. Spectrum efficiency measures will be negatively impacted by the proposal as will the flexibility available for experimenting with digital transmission methods using variable bandwidth based on propagation conditions. In addition, with no established process documented for developing an operating bandplan

acceptable to the amateur community and with no bandplan offered with the proposal, implementation of the proposal will result in chaos on the amateur bands as various organizations and individuals develop, publish, and follow widely varying bandplans. The resulting chaos would significantly increase the arbitration load for the FCC which is at odds with the supposed purpose of the proposal. The proposal should be rejected in whole and sent back to the ARRL with the admonishment that full supporting data should be collected before the proposal is submitted again.

IV. Recommendations

13. Obtaining data on the ability of digital and analog modes to coexist as well as on the spectrum efficiency results of such sharing should be a primary goal of any regulation changes made in the near future. This data would allow informed judgments to be made on how to proceed for the long term. This would be most easily done by setting aside a dual use sub-band in the existing spectrum, allow it to be used for an extended period, and then do a spectrum usage study and spectrum efficiency study to quantify results that can be used in future decisions. It is my recommendation that the existing Novice sub-bands be refarmed into dual use preserves where both analog signals and digital signals with bandwidths equal to or less than 3.5khz are allowed. No restrictions on content would be imposed. Phone, image, and data would all be allowed. This will allow continued experimentation in such areas as variable bandwidth modes, high intelligibility speech using ISB, and high efficiency traffic links using separate data and control links. At the same time, responsible organizations in the amateur community can be developing detailed processes to be followed in formulating a widely accepted bandplan. Once this plan is developed and presented by the amateur community to the FCC, a detailed study of the dual use analog/digital spectrum can be performed, the bandplan process can be implemented, and a coherent plan for future regulation can be presented to the FCC based on measureable, repeatable data.

I appreciate the opportunity you have provided to comment on this proposal. I eagerly await your final decision.

Timothy P. Gorman, AB0WR